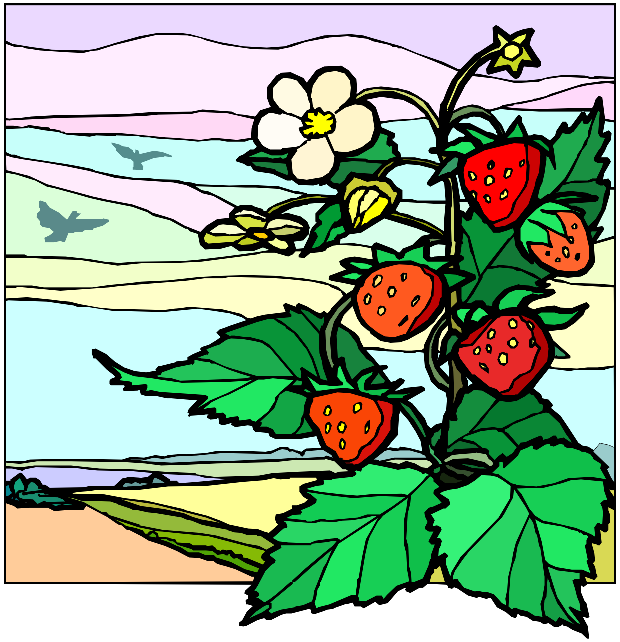
CLASS EXERCISE

CHOKE or BLOAT?

Your community is is located next to a strawberry field which has become infested with pests and requires aerial spraying



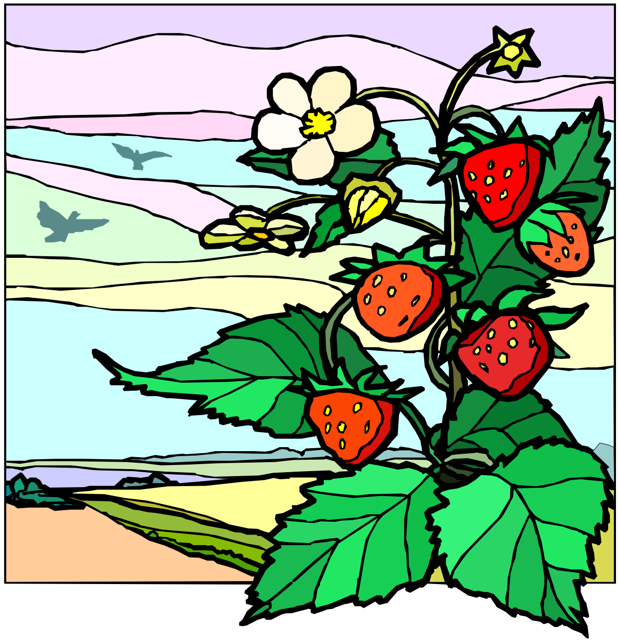
- **CHOKE** works to asphyxiate pests
- **BLOAT** causes fatal swelling
- Both are equally effective and costly
- Both chemicals persistent for long periods of time in the environment

15 2 b.

CHOKE or BLOAT?

Neither are believed to cause cancer but do cause other adverse effects

- **CHOKE affects kidney function**
- **BLOAT reduces liver function**



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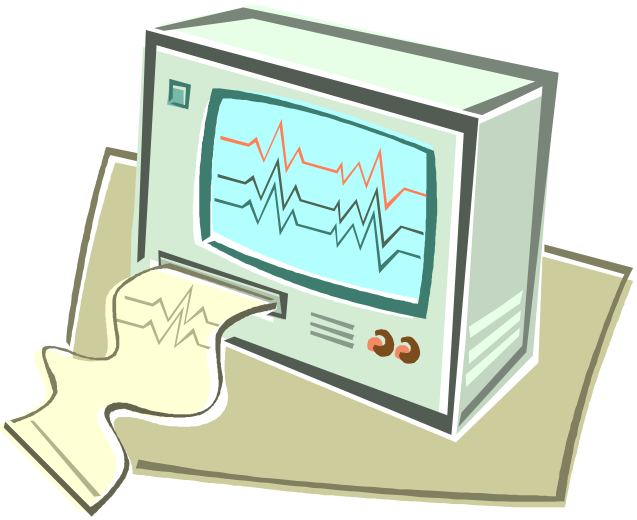
Exposure Concentration (EC)

Modeling indicates that aerial spraying would result in the following exposure concentrations:



- **CHOKE** = 2 mg/m^3
- **BLOAT** = 10 mg/m^3

Which would you choose to use?

15 4 b.

Reference Concentration

"Safe Exposure Level"

The Reference Concentration (RfC) is the inhalation toxicity reference level for effects other than cancer

The RfC is an estimate (with uncertainty spanning perhaps an order of magnitude) of a daily inhalation exposure of the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious effects during a lifetime

Exposures at or below the RfC are generally considered to be of negligible concern

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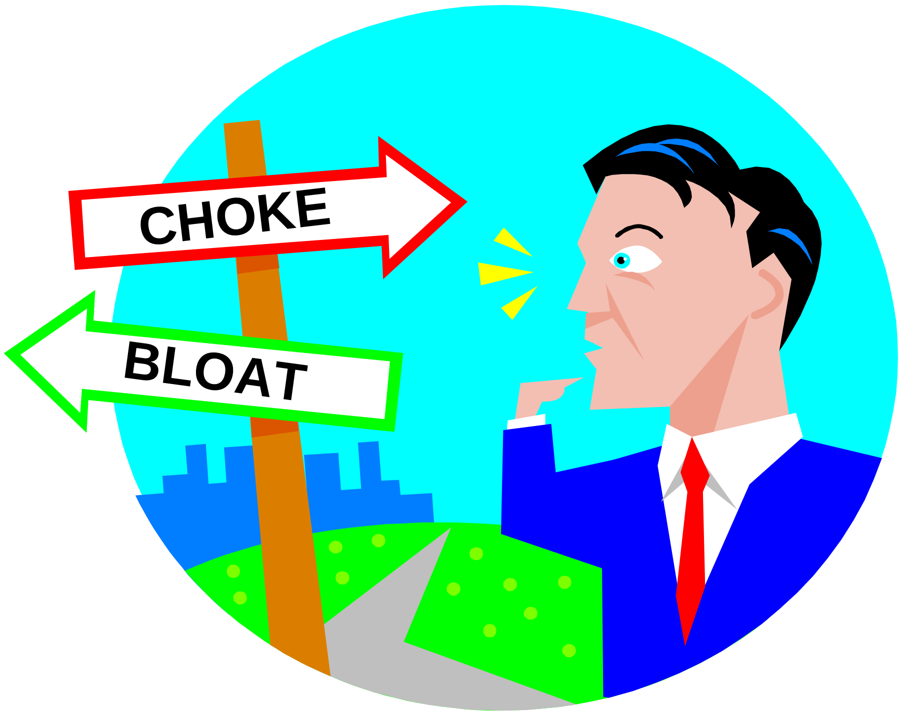
RfCs for CHOKE and BLOAT

CHOKE = $1\ mg/m^3$

BLOAT = $2\ mg/m^3$

Which would you use?



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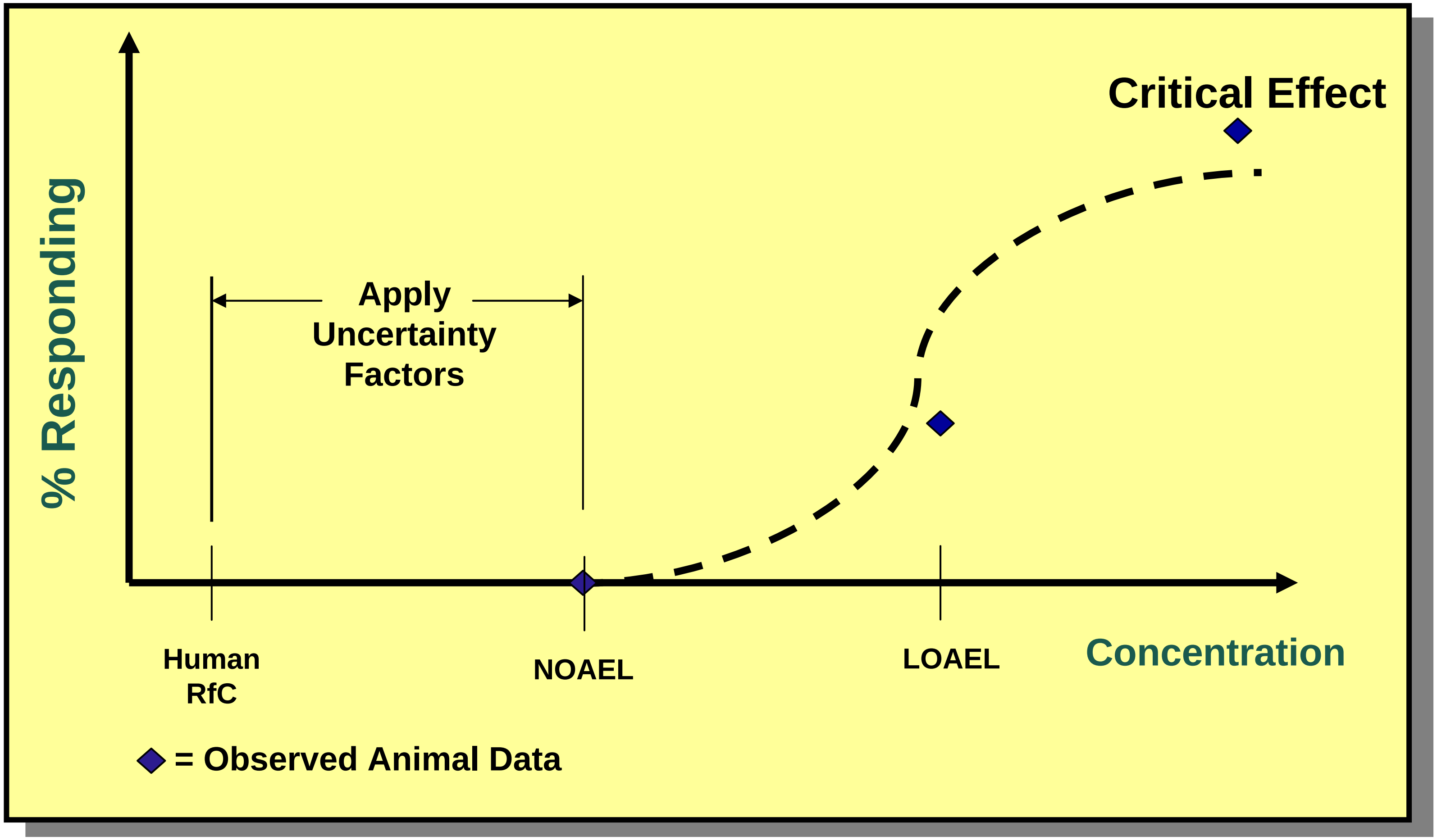
Dose/Response - Noncancer



Dose/Response - Noncancer

CHOKE

Uncertainty = 30

BLOAT

Uncertainty = 1000

15 8
b.

Put it all together....

CHOKE

Reduced kidney function

EC = 2 mg/m^3

RfC = 1 mg/m^3

UF = 30

BLOAT

Reduced liver function

EC = 10 mg/m^3

RfC = 2 mg/m^3

UF = 1000

15 9
b.

Put it all together....

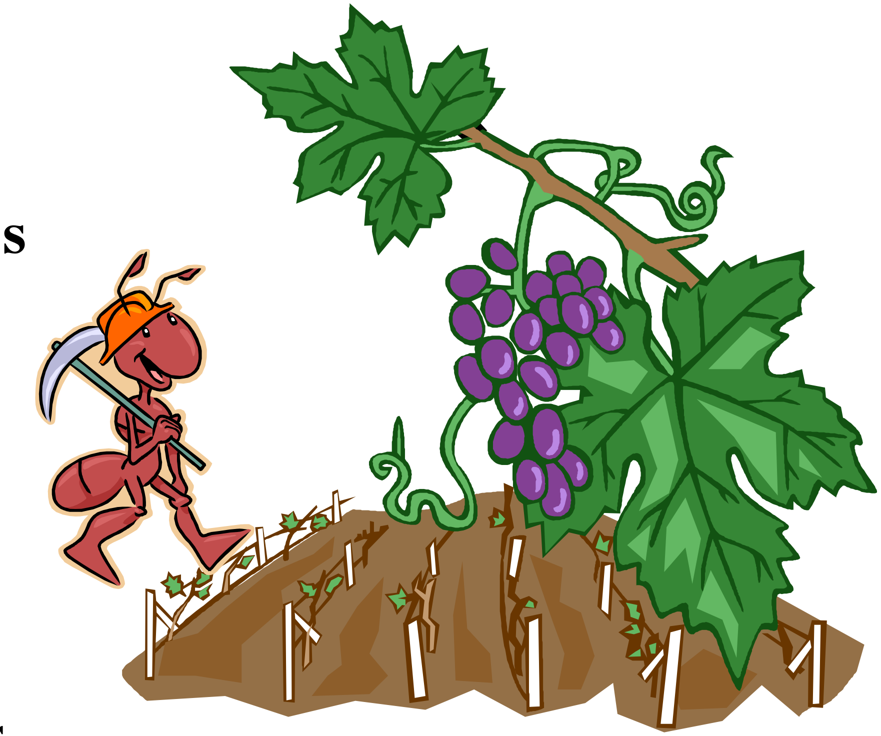
The moral of the story is…

- ECs and RfCs alone mean little
- Data and assumptions must be transparent to end users
- Get all the available information before deciding
- Get used to providing such information to clients

15 10 b.

SMASH or GASP?

- On the other side of your community is a grape farm infested with insects
- Choice of only the pesticides SMASH and GASP
    - Both registered
    - Equally effective
    - Equal price
    - Both are carcinogens
    - Aerial spraying need to save the crop



15 11 b.

Exposure Concentration (EC)

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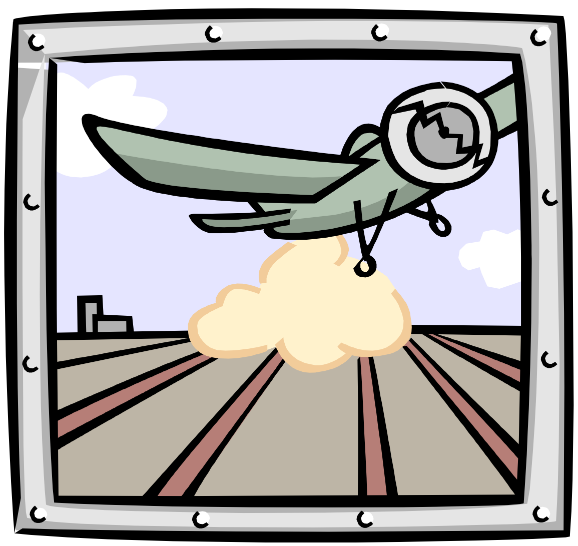


SMASH = 1 ug/m^3

GASP = 5 ug/m^3

You be the judge…
which would you use?

15 12
b.

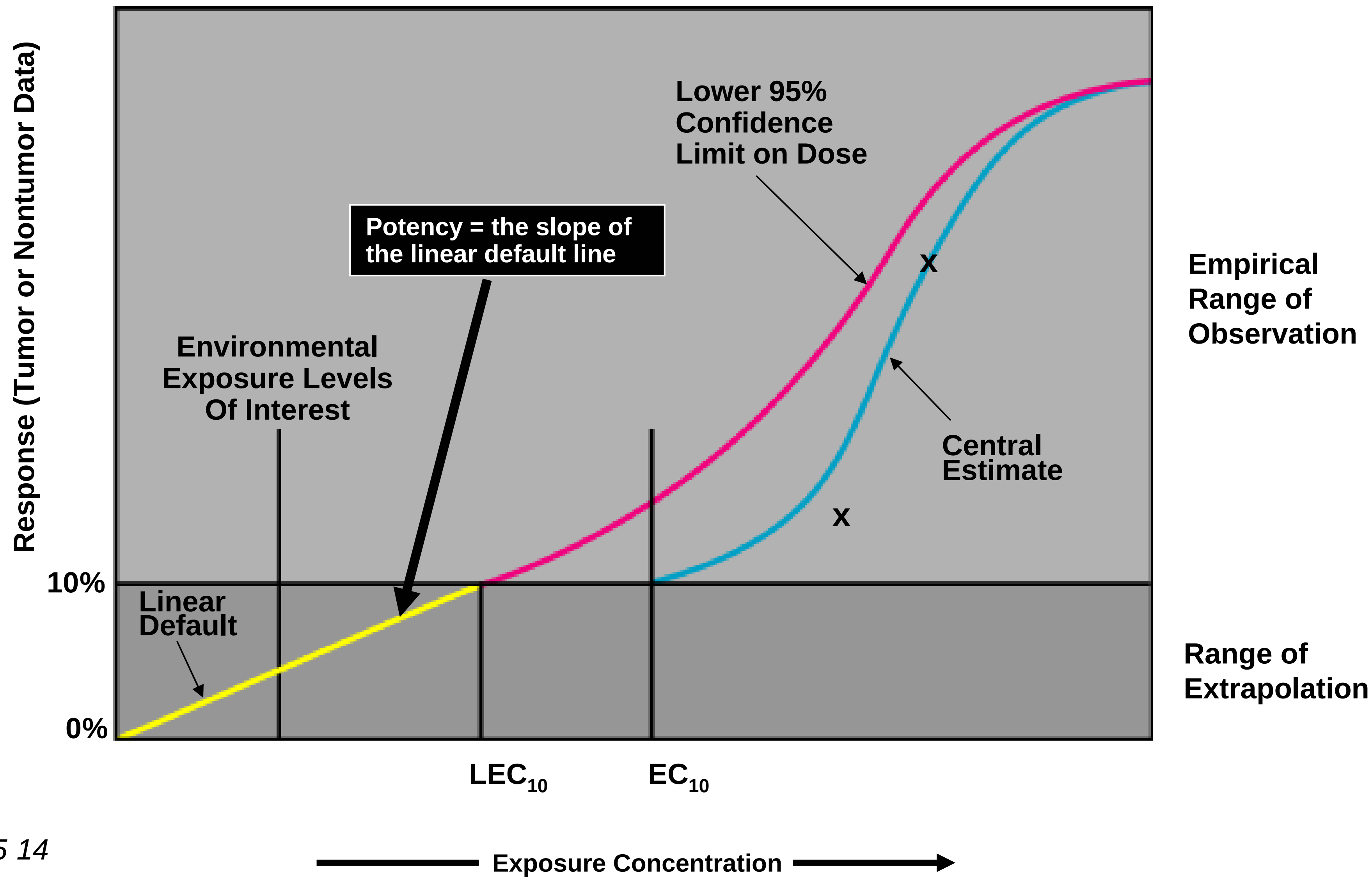
Cancer Potencies

The inhalation unit risk (IUR) is a quantitative estimate of the cancer potency

- Excess lifetime cancer risk estimated to result from continuous exposure to an agent at a concentration of 1 $\mu g/m^3$ in air

The steeper the slope, the more potent a carcinogen the chemical is

Dose-Response - Cancer



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b.

Cancer Potencies

For our chemicals, the IURs are

SMASH = 2 x 10^{-3} risk/ug/m^3

GASP = 2 x 10^{-5} risk/ug/m^3

SMASH is 100 times more potent than GASP

Which would you use?

Oops, we forgot one thing...

EPA classifies **SMASH** as Class "C" – a possible human carcinogen

EPA classifies **GASP** as Class "A" – a known human carcinogen

Now, you be the judge…

Put it all together….

SMASH

Exposure Concentration = 1 μg/m^3
IUR = 2 x 10^{-3} per μg/m^3
Class C Possible carcinogen

GASP

Exposure = 5 μg/m^3
IUR = 2 x 10^{-5} per μg/m^3
Class A Known Human Carcinogen

15 17
b.

Put it all together….

The moral of the story is…

- **ECs and IURs by themselves mean little**
- **Data & assumptions must be transparent to end users**
- **Get all the available information before deciding**
- **Get used to providing such information to clients**